

14. Tribe DALBERGIEAE

黄檀族 huang tan zu

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Trees, shrubs, or lianas, with hard wood. Leaves pulvinate, mostly imparipinnate; stipels absent; leaflets 5 to numerous, alternate or opposite, rarely 1–3-foliolate. Flowers in racemes or panicles, small; bracts and bracteoles usually small and caducous, rarely persistent. Calyx 5-toothed, upper lobes joined higher, sometimes spathaceous, 2-lipped or subtruncate. Standard generally without calluses. Stamens all connate into a sheath split along upper (adaxial) side, or vexillary filament free or absent, or sheath split also on lower side forming two bundles; anthers uniform, dorsifixed, dehiscent by slits or by pores. Ovary sessile to long stipitate, 1- to few ovuled. Legumes with 1(to few) specialized indehiscent seed-chambers, winged, drupaceous or flat and curved, eglandular. Seeds 1–3, globose to oblong-reniform.

About 26 genera (excluding genera of Aeschynomeneae) and ca. 825 species: distributed in the tropics; two genera and 30 species (14 endemic, one introduced) in China.

- 1a. Trees, shrubs, or woody climbers; corolla usually white, sometimes light green, light yellow, or purple; legume oblong, ligulate, elliptic, or strap-shaped, rarely half-moon-shaped 54. *Dalbergia*
1b. Trees; corolla yellow; legume orbicular, compressed, broadly winged around margin 55. *Pterocarpus*

54. DALBERGIA Linnaeus f., Suppl. Pl. 52, 316. 1782, nom. cons.

黄檀属 huang tan shu

Trees, shrubs, or woody climbers. Leaves alternate, imparipinnate; stipules often small and early caducous; leaflets alternate, rarely opposite, estipellate. Inflorescences terminal or axillary, racemes or panicles, usually numerous flowered; bracts and bracteoles usually small, caducous, rarely persistent. Flowers small. Calyx campanulate, 5-toothed; teeth unequal, rarely subequal, lowest tooth usually largest, upper pair usually wider than others and partially connate. Corolla white, pale green, or rarely purple; petals clawed; standard ovate, oblong, or orbicular; wings with base cuneate, truncate, or sagittate; keel often boat-shaped, \pm united above. Stamens 9 or 10, monadelphous, usually united in an open sheath, or diadelphous and then in 2 bundles of 5 each (5+5), or 9 united and 1 free (9+1); anthers erect, small, dehiscent by short apical slits. Ovary stipitate, few ovuled; style usually incurved, long or short; stigma terminal, small. Fruit an indehiscent legume, of 4 types: (a) strongly flattened, translucent, raised over seeds ("samaroid"); (b) thicker, \pm leathery, often with lenticels; (c) thick, \pm woody; (b+c) when more than 1 seed develops, legume lomentaceous. Seeds reniform, compressed, those of legume types b, c, and b+c usually not visible from outside; radicle inflexed.

Between 100 and 120 species: tropical and subtropical regions of North and South America, Africa, and Asia; 29 species (14 endemic, one introduced) in China.

Due to insufficient data, *Dalbergia tonkinensis* (species no. 29) could not be included in the key.

Dalbergia esquirolii H. Léveillé (Fl. Kouy-Tchéou, 230. 1914–1915), described from Guizhou, could not be treated here because no material was seen by the present authors.

- 1a. Stamens 10, filaments connate at base, irregularly separated to incompletely 3–5-adelphous on upper part; leaflets (7 or)9(or 11–13), ovate to ovate-lanceolate, 1.5–4 \times 0.8–1.6 cm 28. *D. polyadelpha*
1b. Stamens 9 or 10, monadelphous or diadelphous.
2a. Stamens 10, diadelphous (5+5).
3a. Leaflets numerous (13–21); stipules large, leaflike, ovate-lanceolate or falcate-lanceolate; inflorescence densely brown villous, pubescent, or silky pubescent.
4a. Legume 2.5–5 \times 0.6–1 cm; leaflets abaxially densely pubescent 25. *D. sericea*
4b. Legume 5–11 \times 1.2–3.2 cm; leaflets sparsely appressed puberulent, gradually glabrous.
5a. Length of leaflet blade nearly 3 \times width; legume wider, apex obtuse or broadly cuneate, base rounded or broadly cuneate 23. *D. stipulacea*
5b. Length of leaflet blade 1.5–2 \times width; legume narrower, apex acute, base attenuate to cuneate 24. *D. assamica*
3b. Leaflets fewer (7–17); stipules small, not leaflike; inflorescence sparsely puberulent.
6a. Leaflets shortly acuminate, never emarginate at apex; standard obovate-oblong; corolla pink 26. *D. hainanensis*
6b. Leaflets rounded, obtuse, or slightly emarginate at apex; standard orbicular; corolla white or light purple.
7a. Leaflet abaxial surface with finely reticulate veinlets; legume 16–23 mm wide 11. *D. volubilis*
7b. Leaflet abaxial surface without obvious reticulate veinlets; legume narrow, 13–15 mm wide 27. *D. hupeana*
2b. Stamens 9, occasionally 10, monadelphous.
8a. Leaflets less than 2 cm, numerous, usually more than 21 (21–41) (except *D. tsoi* occasionally with 17).

- 9a. Legume reddish brown when dry, strongly reticulate throughout; leaflets 17–27, elliptic to oblong 1. *D. tsoi*
- 9b. Legume not reddish brown, finely reticulate everywhere or opposite seeds; leaflets 21–42, linear-oblong or narrowly oblong, 2.5–3 × as long as wide.
- 10a. Leaflets trapezoid-oblong, two sides of base asymmetric, one side rounded, other side cuneate; petals long clawed; inflorescence densely rusty puberulent; legume brown and shiny when dry 2. *D. pinnata*
- 10b. Leaflets symmetric at base (except *D. millettii* with leaflets slightly asymmetric); petals shortly clawed; inflorescence somewhat hairy or glabrous; legume dull colored, not shiny when dry.
- 11a. Leaflets membranous, oblong, 8–15 mm, appressed brown silky pubescent on both surfaces; standard transversely elliptic 3. *D. peishaensis*
- 11b. Leaflets papery, linear-oblong or narrowly oblong, glabrous on both surfaces or hairy when young, glabrous when old; standard oblong-obovate, broadly obovate, or orbicular.
- 12a. Leaflets 31–41, obtuse or rounded at both ends; legume ca. 7.5 mm wide 4. *D. stenophylla*
- 12b. Leaflets 21–35, truncate, emarginate at apex, cuneate or broadly cuneate at base; legume 10–20 mm wide.
- 13a. Standard oblong-obovate; legume reticulate opposite seeds 5. *D. mimosoides*
- 13b. Standard orbicular; legume veined throughout 6. *D. millettii*
- 8b. Leaflets more than 2 cm (except *D. hancei* with leaflets 1–2 cm).
- 14a. Leaflets 3–5.
- 15a. Leaflets suborbicular or obcordate, length and width of blade subequal, apex rounded and shortly caudate, both surfaces glabrous and adaxially shiny when old; teeth of calyx unequal, lowest lanceolate, longer than others; legume faintly reticulate opposite seeds 7. *D. sissoo*
- 15b. Leaflets ovate, longer than wide, obtuse, slightly emarginate at apex, abaxially densely rusty pubescent; teeth of calyx subequal, triangular; legume distinctly reticulate throughout 8. *D. henryana*
- 14b. Leaflets 5–15.
- 16a. Legume half-moon-shaped, less than 2.5 cm when 1-seeded; inflorescence sessile; woody climbers growing in littoral region 9. *D. candenatensis*
- 16b. Legume oblong, ligulate-oblong, or strap-shaped, longer than 3 cm; inflorescence with peduncle; plants not of littoral region.
- 17a. Teeth of calyx subequal in length, triangular, broadly triangular, ovate-triangular, or ovate.
- 18a. Standard not reflexed, obovate or elliptic; ovary shortly stipitate 10. *D. hancei*
- 18b. Standard reflexed, orbicular or elliptic; ovary long stipitate.
- 19a. Leaflets ovate-lanceolate, 7–10 cm, apex acute 12. *D. kingiana*
- 19b. Leaflets ovate, elliptic, or oblong, 3.5–6 cm, apex obtuse, rounded, or emarginate.
- 20a. Climbers; leaflets 5–7, base cuneate; standard elliptic, base shortly auriculate 13. *D. benthamii*
- 20b. Trees; leaflets 9–13, base rounded; standard orbicular, base not auriculate 14. *D. burmanica*
- 17b. Teeth of calyx unequal in length, lowest teeth lanceolate or oblong (*D. rimosa* with lowest tooth of calyx lanceolate, but subequal in length to others).
- 21a. Leaflets less than 4 cm (1–4 × 0.8–2 cm; though sometimes larger and up to 5.5 cm in *D. ximengensis*).
- 22a. Climbers or shrubs; standard oblong, obovate-oblong, or suborbicular.
- 23a. Large climbers; leaflets thinly leathery, glabrous, shiny adaxially, veinlets finely and closely reticulate, conspicuously prominent on both surfaces 15. *D. dyeriana*
- 23b. Shrubs; leaflets papery, appressed sparsely grayish white pubescent and veins slightly impressed adaxially 16. *D. jingxiensis*
- 22b. Trees; standard obovate or obcordate.
- 24a. Leaflets (7–)11–13, leathery, ovate-elliptic or oblong, adaxially glabrous, terminal and lateral leaflets subequal in length 17. *D. cultrata*
- 24b. Leaflets 7–9, thickly papery, elliptic or obovate, adaxially appressed pubescent, terminal and lateral leaflets very unequal in length (terminal leaflet often more than 4 × as large as lowest) 18. *D. ximengensis*

- 21b. Leaflets more than 4 cm (4–14 × 2–8 cm; though sometimes smaller and less than 4 cm in *D. yunnanensis*).
- 25a. Leaflets rounded at both ends, slightly emarginate at apex.
- 26a. Leaflets 2.5–5(–7.5) × 1–2(–3.3) cm, length usually ca. 2 × width, both surfaces appressed puberulent, more densely so on midvein abaxially; standard obovate-oblong 19. *D. yunnanensis*
- 26b. Leaflets 5–14 × 4.5–8 cm, length and width subequal or length slightly exceeding width, both surfaces glabrous; standard oblong ... 20. *D. obtusifolia*
- 25b. Leaflets acuminate or acute at apex.
- 27a. Leaflets glabrous on both surfaces; legume ± inconspicuously reticulate, reticulation distinctly prominent opposite seeds 21. *D. odorifera*
- 27b. Leaflets sparsely hairy; legume reticulate throughout, reticulation conspicuously and slightly prominent opposite seeds 22. *D. rimosa*

1. *Dalbergia tsoi* Merrill & Chun, Sunyatsenia 2: 244. 1935.

红果黄檀 hong guo huang tan

Woody climbers. Leaves 8–10 cm; rachis pubescent; leaflets 17–27; petiolules ca. 1 cm; blades elliptic to oblong, 10–17(–30) × 5–8(–14) cm, both surfaces appressed pubescent, veins and veinlets obscure, base rounded or broadly cuneate, apex rounded, emarginate. Panicles axillary, branches few, corymbose. Flowers minute, ca. 3.5 mm. Pedicels 1–1.5 mm, puberulent as calyx and bracteoles; basal bracteoles orbicular; epicalycine bracteoles suborbicular, persistent. Calyx campanulate, 5-toothed; teeth all ciliate, elliptic except lowest cucullate-lanceolate, longer, apex rounded or obtuse. Corolla ca. 3 mm; standard transversely elliptic, emarginate, cuneate, base attenuate to a short, broad claw; wings and keel oblong, all auriculate, with claw narrow, ca. 0.8 mm. Stamens 9, monadelphous. Ovary oblong, glabrous except on long stipe and along lower suture; stigma capitate. Legume oblong or linear, compressed, 5–7 × 1.2–2 cm, with rounded, apiculate tip, distinctly and strongly reticulate throughout or opposite seeds, usually reddish brown when dry, 1- or rarely 2-seeded. Seeds reniform, compressed, ca. 9 × 5 mm. Fl. Apr, fr. Jul–Dec.

- Dense forests, ravines; 100–900 m. Hainan.

2. *Dalbergia pinnata* (Loureiro) Prain, Ann. Roy. Bot. Gard. (Calcutta) 10: 48. 1904.

斜叶黄檀 xie ye huang tan

Derris pinnata Loureiro, Fl. Cochinch. 2: 432. 1790; *Dalbergia tamarindifolia* Roxburgh.

Trees or sometimes shrubby climbers. Branches long, flexuose; young branchlets puberulent. Leaves 12–15 cm; rachis and petioles densely puberulent as short petiolules; stipules lanceolate, ca. 5 mm, puberulent; leaflets 21–42, trapezoid-oblong, small, 12–18 × 5–7.5 mm, firmly papery, both surfaces puberulent, at length abaxially glaucous, adaxially glabrescent, base asymmetric, apex rounded, slightly emarginate. Panicles axillary, congested, with corymblike branches, 1.5–5 × 1.2–2.5 cm; peduncles short, as branches and pedicels densely puberulent; bracts and bracteoles persistent, ovate, puberulent. Flowers small, ca. 6 mm. Calyx campanulate, ca. 3 mm, outside puberulent or glabrescent; teeth ovate, upper 2 subconnate. Corolla white; petals long clawed; standard reflexed, ovate; wings with sagittate base; keel united above, blade hastate on upper side below. Stamens 9 or 10, monadelphous. Ovary stip-

itate, glabrous; ovules 2 or 3. Legume brown and shiny when dry, oblong-ligulate, thin, 2.5–6 × 1–1.4 cm, glabrous, uniformly finely reticulate, base attenuate to long slender stipe, acute, 1–4-seeded. Seeds narrow, ca. 18 × 4 mm. Fl. Jan–Apr, fr. May–Jul.

Dense forests; below 1400 m. Guangxi, Hainan, Xizang, Yunnan [Indonesia (Java), Laos, Malaysia, Myanmar, Philippines, Thailand, Vietnam].

3. *Dalbergia peishaensis* Chun & T. C. Chen, Acta Phytotax. Sin. 7: 24. 1958.

白沙黄檀 bai sha huang tan

Woody climbers. Stems glabrous; young shoots sparsely puberulent. Leaves 10–14 cm; petiole puberulent; leaflets 21–31; petiolules ca. 1 mm, puberulent; blades oblong, small, 8–15 × 3–6 mm, membranous, both surfaces appressed silky pubescent, base rounded or cuneate, somewhat slightly oblique, apex obtuse to rounded, cuspidate. Panicles axillary, 3–5 × 3–4 cm, rusty pubescent; peduncles 1–2 cm. Flowers minute, 2.5–3 mm, aggregated at apices of few branches of inflorescence; bracts ovate, minute, ca. 0.8 mm, apex acute; bracteoles 2, oblong, larger than bracts, persistent. Pedicel ca. 1 mm. Calyx shallowly campanulate, ca. 1 mm, 5-toothed; teeth unequal, lowest broadly ovate, upper pair half-orbicular, larger than lateral ones, lateral 2 ovate. Corolla white; petals subequal in length, shortly clawed; standard transversely elliptic, base subhastate, apex emarginate; wings obovate-oblong; keel broadly elliptic, base of blade auriculate. Stamens 10, monadelphous. Ovary stipitate, oblanceolate, glabrous except on lower suture, 3-ovuled; style short. Legume oblong, finely reticulate throughout. Fl. Apr, fr. Jun.

- Dense forests. Hainan.

4. *Dalbergia stenophylla* Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 70: 56. 1901.

狭叶黄檀 xia ye huang tan

Dalbergia cavaleriei H. Léveillé.

Woody climbers. Branchlets dark brown or nearly blackish when dry, glabrous or sparsely puberulent. Leaves 4–6(–10) cm; rachis and petiole sparsely puberulent; stipules caducous, ovate; leaflets 31–41; petiolules short, subglabrous; blades narrowly linear-oblong, ca. 12 × 3 mm, both surfaces appressed sparsely puberulent when young, soon glabrous except abaxi-

ally on midvein, apex obtuse or rounded. Panicles axillary, 4–6 cm; peduncles, rachis, branches, and pedicels puberulent. Flowers small, 3–4 mm; bracteoles puberulent, basal persistent, lanceolate, epicalycine bracteoles embracing lower 1/3 of calyx tube, deciduous. Calyx campanulate, ca. 1.5 mm, sparsely puberulent; teeth short, upper pair obtuse, lateral acute, lowest longer than others, broadly lanceolate. Corolla white or pale yellow; petals shortly clawed; standard broadly ovate to suborbicular, emarginate; wings oblong; keel obovate, blade hastate on upper side below. Stamens 9, monadelphous; filaments alternately shorter and longer. Ovary long stipitate, sparsely pubescent along sutures, 3-ovuled; style short; stigma small. Legume ligulate to strap-shaped, 2.5–5 × ca. 0.75 cm, base attenuate to distinct stipe, apex subacute, 1- or 2-seeded. Seeds reniform, compressed. Fl. May–Jun, fr. Aug–Nov.

Among bushes in wet ravines. Guangxi, Guizhou, Hubei, Sichuan [Vietnam].

5. *Dalbergia mimosoides* Franchet, Pl. Delavay. 187. 1890.

象鼻藤 xiang bi teng

Dalbergia millettii Benth. var. *mimosoides* (Franchet) Thothathri.

Shrubs, 4–6 m tall. Branches many, spreading; young shoots densely brown tomentose. Leaves 6–8(–10) cm; rachis, petiole, and petiolules densely pubescent initially, gradually glabrescent; stipules caducous, ovate, membranous; leaflets 21–35, linear-oblong, small, 6–12(–18) × 5–6 mm, both surfaces finely rusty pubescent especially abaxially on midvein when young, glabrous or nearly so when old, finely reticulate veinlets blackish when dry, base rounded or broadly cuneate, margin of young leaflets of flowering branches obscurely undulate, apex truncate, obtuse, or emarginate. Panicles axillary, shorter than leaves, 1–1.5 cm, with corymbose branches; peduncles, rachis, branches, and pedicels appressed pubescent. Flowers small, ca. 5 mm, slightly compact; bracteoles deciduous, ovate, pubescent. Calyx campanulate, sparsely puberulent; teeth ciliate, ovate except lowest lanceolate. Corolla white or pale yellow; petals shortly clawed; standard oblong-obovate, emarginate; wings obovate-oblong; keel elliptic. Stamens 9, occasionally 10, monadelphous; filaments alternately longer and shorter. Ovary stipitate, glabrous except lower suture sparsely pilose, 2- or 3-ovuled; style short; stigma small. Legume stipitate, oblong to strap-shaped, 3–6 × 1–2 cm, leathery, glabrous, reticulate opposite 1 seed, rarely 2-seeded, base obtuse or cuneate, apex acute. Seeds reniform, compressed, ca. 10 × 6 mm. Fl. Apr–May, fr. Jun–Aug.

• Open forests, ravines, among bushes on mountain slopes; 800–2000 m. Guizhou, Hubei, Shaanxi, Sichuan, Xizang, Yunnan, Zhejiang.

6. *Dalbergia millettii* Benth. J. Linn. Soc., Bot. 4(Suppl.): 34. 1860.

香港黄檀 xiang gang huang tan

Woody climbers. Branches sometimes hooked, blackish when dry, glabrous. Leaves 4–5 cm; stipules caducous, narrowly lanceolate, 2–3 mm; petiole and petiolules glabrous; leaflets 23–35, small, closely set, linear or narrowly oblong,

(4–)10–15 × (2–)3–5 mm, both surfaces glabrous, base rounded or obtuse, somewhat unequal on two sides, apex truncate, sometimes emarginate; distal ones often obovate or obovate-oblong. Panicles axillary, compact, 1–1.5 cm; peduncles, rachis, and branches very sparsely puberulent. Pedicel very short. Flowers minute, 2.5–3 mm; bracts persistent; bracteoles deciduous, ovate, ciliate, embracing lower 1/3 of calyx tube. Calyx campanulate, ca. 1 mm, nearly glabrous; teeth short, subequal in length, lateral ovate, upper 2 rounded, subconnate, obtuse except for lowest, lowest triangular, acute. Corolla white; petals shortly clawed; standard orbicular, emarginate; wings ovate-oblong; keel oblong. Stamens 9, monadelphous. Ovary stipitate, sparsely pilose, 2- or 3-ovuled; style short; stigma small. Legume stipitate, oblong to linear, compressed, 4–6 × 1.2–1.6 cm, glabrous, leathery, reticulate veined throughout, but more conspicuously so opposite 1 seed, rarely 2-seeded, base broadly cuneate, apex obtuse or rounded. Seeds reniform, compressed, 8–12 × ca. 6 mm. Fl. May, fr. Aug.

• Sparse or dense forests, ravines; 300–800 m. Guangdong, Guangxi, Shaanxi, Zhejiang.

7. *Dalbergia sissoo* Roxburgh ex Candolle, Prodr. 2: 416. 1825.

印度黄檀 yin du huang tan

Trees, with rough, gray bark. Branches numerous, horizontally spreading; young shoots puberulent. Leaves 12–15 cm; stipules caducous, lanceolate; leaflets 3–5; petiolules 8–10 mm, initially puberulent, ultimately glabrous; blades green when young, shiny when old, suborbicular, occasionally rhombic-obovate, 3.5–6 cm, puberulent when young, glabrous when old, apex rounded, shortly caudate. Panicles axillary, short, ca. 7 cm; rachis and bracteoles puberulent. Flowers nearly sessile, fragrant; bracts caducous, lanceolate. Calyx campanulate, 6–7 mm, enclosed within 2 large, broadly ovate, membranous, very caducous bracteoles, outside puberulent, 5-toothed; teeth shorter than tube, upper pair rounded, lateral 2 subacute, shorter than lowest, lowest rather narrowly lanceolate. Corolla yellowish white; petals rather long clawed; standard broadly obovate, emarginate; wings and keel oblanceolate, base without auricles, cuneate, attenuate to claw. Stamens 9, monadelphous. Ovary oblong, pubescent, with rather long stipe ca. 4.5 mm, 4–6-ovuled; style very short; stigma capitate. Legume pale brown when dry, linear-oblong to strap-shaped, 4–8 × 0.6–1.2 cm, leathery, glabrous, faintly veined opposite 1 or 2(or 3) seeds. Seeds reniform, compressed. Fl. Mar–Apr, fr. Jun–Nov.

Cultivated; 900–1500 m. Fujian, Guangdong, Hainan, Taiwan, Zhejiang [native to India; widely cultivated in the tropics].

8. *Dalbergia henryana* Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 70: 46. 1901.

蒙自黄檀 meng zi huang tan

Woody climbers, large. Young shoots densely rusty pubescent. Leaves 12–22 cm; rachis, petiole, and petiolules densely rusty pubescent; leaflets 4 or 5, ovate, 6–8.5 × 3.5–4 cm, leathery, abaxially pubescent, adaxially glabrous, base cuneate or rounded, apex obtuse, sometimes emarginate, acute when young; terminal leaflets largest. Panicles axillary, lax, (3.5–)6–8.5 cm; peduncles short, ca. 1 cm, rusty pubescent as

rachis, branches, and pedicels. Flowers 5–6 mm; bracts and bracteoles deciduous, ovate, puberulent, obtuse. Calyx campanulate, 3–4 mm, outside rusty tomentose, 5-toothed; lowest tooth longest, lanceolate, others subequal, triangular, obtuse, upper 2 subconnate. Corolla white; petals long clawed; standard reflexed, suborbicular, slightly emarginate, wings and keel auriculate at base; wings oblong. Stamens 9, monadelphous; filaments free in upper 1/4 and alternately shorter and longer. Ovary long stipitate, puberulent as stipe, 2-ovuled; style subulate, slender; stigma minute. Legume yellowish brown when dry, ligulate to strap-shaped, thinly leathery, finely reticulate throughout, somewhat shiny, 1- or 2-seeded. Fl. Mar–Apr, fr. Jun–Aug.

• Dense forests on mountain slopes, among bushes at bases of mountains; 700–1300 m. Guizhou, SE Yunnan.

9. *Dalbergia candenatensis* (Dennstedt) Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 70: 49. 1901.

弯枝黄檀 wan zhi huang tan

Cassia candenatensis Dennstedt, Schlüssel Hortus Malab. 32. 1818; *Dalbergia monosperma* Dalzell.

Woody climbers. Branches blackish when dry, glabrous, apex often twisting and spirally hooked. Leaves 6–7.5 cm; leaflets (3–)5–7; petiolules ca. 1.5 mm, slightly puberulent or subglabrous; blade abaxially glaucous, adaxially dark green, obovate-oblong, 1.5–3 × 1–2 cm, abaxially very sparsely appressed puberulent, adaxially glabrous, base cuneate, sometimes subrounded, apex rounded or obtuse, sometimes emarginate. Panicles axillary, 2.5–5 cm, subsessile or with very short peduncles; branches slightly puberulent; bracts ovate-lanceolate; bracteoles larger than bracts, broadly ovate, embracing lower 1/3 of calyx tube. Calyx broadly campanulate, subglabrous; teeth subequal, broadly triangular to ovate, obtuse, upper pair of teeth subconnate. Corolla white; petals long clawed; standard reflexed, oblong; wings obovate-oblong, sagittate on upper side; keel oblong, united above, auriculate on upper side below. Stamens 9(or 10), monadelphous. Ovary stipitate, oblong, glabrous, 1(or 2)-ovuled; style subulate, slender; stigma small. Legume shortly stipitate, half-moon-shaped, compressed, 2–2.4 cm when 1-seeded, 3.5–4 cm when 2-seeded, 1–1.2 cm wide, firmly leathery, ventral suture straight, dorsal suture arcuate, faintly reticulate throughout, not prominent opposite seeds. Seeds reniform, compressed, ca. 6 × 3 mm. Fl. May–Aug, fr. Jun–Nov.

Coastal areas, climbing on trees in forests; sea level to 200 m. SE and SW Guangdong, SE Guangxi [Bangladesh, Cambodia, Indonesia, Malaysia, Philippines, Sri Lanka, Thailand, Vietnam].

10. *Dalbergia hancei* Benth, J. Linn. Soc., Bot. 4(Suppl.): 44. 1860.

藤黄檀 teng huang tan

Woody climbers. Branches slender; young shoots slightly pubescent; branchlets sometimes hooked or twisted. Leaves 5–8 cm; stipules caducous, lanceolate, membranous; leaflets 7–13, narrowly oblong or obovate-oblong, 10–20 × 5–10 mm, both surfaces initially sparsely appressed pubescent, soon glabrous adaxially, persistently pubescent abaxially, base rounded or broadly cuneate, apex obtuse or rounded, emarginate. Flowers

small, in axillary, compact, short panicles; bracts early deciduous, scaly, boat-shaped, imbricate, enclosing young inflorescence. Pedicel 1–2 mm; bracteoles deciduous, rusty puberulent, basal minute, lanceolate, epicalycine pair ovate, enclosing base of calyx tube. Calyx broadly campanulate, ca. 3 mm, outside rusty puberulent; teeth broadly triangular, very short, ciliate, obtuse or rounded except for lowest, lowest rather longer, acute. Corolla greenish white, fragrant, ca. 6 mm, rather long clawed; standard elliptic, emarginate, base of blade truncate, auriculate, attenuate to broad claw; wings and keel oblong. Stamens 9 or sometimes 10, monadelphous, sometimes with a free vexillary stamen. Ovary shortly stipitate, linear, glabrous except for ciliate ventral suture; style short; stigma small. Legume distinctly stipitate, oblong or strap-shaped, compressed, 3–7 × 0.8–1.4 cm, glabrous, 1-seeded, rarely 2–4-seeded. Seeds reniform, compressed, ca. 8 × 5 mm. Fl. Mar–May, fr. Jun–Nov.

• Among bushes on mountain slopes, by streams along valleys; 200–1500 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Jiangxi, Sichuan, Zhejiang.

11. *Dalbergia volubilis* Roxburgh, Pl. Coromandel 2: 48. 1805.

南亚黄檀 nan ya huang tan

Woody climbers, large, occasionally erect. Branches glabrescent, twining or twisted into spiral hooks; branchlets puberulent, striate. Leaves 7–20 cm; leaflets 9–13, obovate to ovate-elliptic, 2.5–7 × 1.6–3 cm, glabrous, veinlets finely reticulate abaxially, base narrow, apex obtuse and mucronulate. Panicles terminal, rarely axillary, copiously branched, 13.5–30 cm. Flowers 6–8 mm; bracts lanceolate. Calyx campanulate, outside rusty tomentose; teeth 5, lowest one lanceolate, much longer than rest, upper 2 subconnate. Corolla blue to lilac; standard orbicular, reflexed; wings obliquely oblong, clawed; keel boat-shaped, clawed. Stamens 10, diadelphous (5+5), staminal sheath 4.5–5.5 mm; filaments free in upper 1/3. Ovary 4–5 mm, stipitate, pubescent at sutures and stipe, 2-ovuled; style slender; stigma minute. Legume indehiscent, oblong, rarely ovate-oblong, 5–9 × 1.6–2.3 cm, stalked, glabrous, uniformly reticulate, narrowed at base, obtuse to mucronate at apex. Seeds reniform, compressed, ca. 7 × 5 mm. Fl. Jan–May, fr. Mar–Jun.

Sparse forests, climbing on trees, among bushes; 100–700 m. SW Yunnan (Gengma) [Bangladesh, India, Myanmar, Sri Lanka].

This species was recorded from China by S. J. Li and H. Wu (J. Trop. Subtrop. Bot. 15: 171–172. 2007) based on *G. Forrest 12139* (BM, K).

12. *Dalbergia kingiana* Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 67: 289. 1898.

滇南黄檀 dian nan huang tan

Shrubs. Branches puberulent, soon glabrous, lenticellate. Leaves 17–20 cm; rachis and petiole initially puberulent, later glabrous; leaflets 7–9; petiolules initially finely puberulent, ultimately glabrescent; blade abaxially pale green, ovate-lanceolate, 7–10 × 3–4 cm, lowest rather smaller than others, leathery, abaxially sparsely puberulent when young, soon glabrous, adaxially glabrous, base cuneate, apex acute. Panicles axillary, short, 5–7 × ca. 5 cm; branches broadly spreading; peduncles, rachis, branches, and short pedicels rusty tomentose; bracts

deciduous, ovate-lanceolate, obtuse; bracteoles spatulate-lanceolate. Calyx campanulate, extremely rusty tomentose; teeth subequal, triangular, upper 2 subconnate, broader. Corolla white; petals long clawed; standard reflexed, orbicular; keel half-moon-shaped, auriculate as elliptic wings. Stamens 9, monadelphous. Ovary long stipitate, oblong, glabrous, 2-ovuled; style subulate, slender; stigma minute. Legume unknown.

- Mountain slopes; ca. 1300 m. Yunnan (Simao).

13. *Dalbergia benthamii* Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 67: 289. 1898 [*"benthami"*].

两粤黄檀 liang yue huang tan

Climbing shrubs, large, occasionally erect. Branches black, long, glabrous. Leaves 12–17 cm; rachis and petioles appressed puberulent; leaflets 5–7, ovate or elliptic, 3.6–6 × 1.5–3 cm, subleathery, abaxially glaucous and minutely appressed puberulent, adaxially glabrous, base cuneate, apex obtuse, emarginate. Panicles axillary, ca. 4 × 2.5 cm; short peduncle and slender pedicels ca. 2.5 mm, rusty tomentose. Flowers ca. 8 mm, fragrant; bracts deciduous, oblong; bracteoles persistent, lanceolate. Calyx campanulate, outside rusty tomentose; teeth subequal, ovate-triangular, obtuse. Corolla white; petals long clawed; standard reflexed, elliptic, base shortly auriculate, emarginate; wings obovate-oblong, incurved auriculate on upper side below as keel; keel half-moon-shaped, with claws ca. as long as calyx. Stamens 9, monadelphous. Ovary long stipitate, glabrous, 2- or 3-ovuled; style subulate. Legume ligulate-oblong, 5–7.5 × ca. 1.5 cm, thinly leathery, 1- or 2-seeded. Seeds reniform, compressed, ca. 11 × 5 mm. Fl. Mar–Jun, fr. Jul–Oct.

Sparse forests, among bushes, climbing on trees; 100–700 m. Guangdong, Guangxi, Guizhou, Hainan, Taiwan [Vietnam].

14. *Dalbergia burmanica* Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 66: 448. 1897.

缅甸黄檀 mian dian huang tan

Trees, 7–10 m tall, with spreading branches, or occasionally climbers. Branches densely rusty puberulent. Leaves 12–17 cm; stipules very caducous, lanceolate, small; leaflets 9–13; petiolules 2–3 mm; blades narrowly ovate and acute when young, oblong and obtuse when mature, (2.5–)4–6 × 1.5–2 cm, lowest rather smaller than others, membranous, both surfaces initially silky pubescent, ultimately subglabrous adaxially, sparsely pubescent abaxially, base slightly unequal, apex rounded or emarginate. Panicles lateral, with corymbose branches, appearing shortly before leaves; peduncles, branches, rachis, and ca. 2 mm pedicels densely rusty pubescent. Flowers 6–8 mm; basal and epicalycine bracteoles lanceolate. Calyx campanulate, ca. 3 mm, outside rusty pubescent; teeth subequal, acute, upper pair rather wider than lower 3. Corolla purple or white (according to field notes); petals long clawed; standard orbicular, emarginate, reflexed; wings and keel with downward auricles on upper side below. Stamens 9, monadelphous. Ovary long stipitate, glabrous, 1–3-ovuled; style slender; stigma small. Legume distinctly stipitate, yellowish brown, ligulate-oblong, thin, (5–)7–9 × 1.5–2 cm, glabrous, acute and with an apiculate tip at apex when young, rounded at both ends when

mature, reticulate throughout, 1- or 2-seeded. Seeds narrowly oblong, compressed, 10–12 × 6–7 mm. Fl. Apr, fr. Jun.

Mountain slopes, broad-leaved forests, by streams; 600–1700 m. Guizhou, Yunnan [Myanmar].

15. *Dalbergia dyeriana* Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 70: 44. 1901.

大金剛藤 da jin gang teng

Woody climbers, large. Branchlets rather slender, glabrous. Leaves 7–13 cm; leaflets (7–)9–15; petiolules 2–2.5 mm; blade adaxially shiny, obovate-oblong or oblong, 2.5–4(–5) × 1–2(–2.5) cm, thinly leathery, abaxially sparsely appressed pubescent, adaxially glabrous, veinlets finely closely reticulate, prominent on both surfaces, apex rounded or retuse, occasionally emarginate. Panicles axillary, lax, few flowered, 3–5 × ca. 3 cm; peduncles, branches, and pedicels puberulent. Pedicel 1.5–3 mm; bracts and bracteoles deciduous, oblong and lanceolate. Calyx campanulate, puberulent, soon glabrous; teeth triangular, obtuse, upper 2 widest, lowest longer than others, subacute. Corolla yellowish white; petals slightly long clawed; standard oblong, emarginate; wings ovate-oblong, without auricles; keel narrowly oblong, shortly auriculate on upper side below. Stamens 9, monadelphous; filaments free in upper 1/4. Ovary shortly stipitate, puberulent or subglabrous, 1–3-ovuled; style short, glabrous; stigma small. Legume distinctly stipitate, oblong or strap-shaped, compressed, 5–6(–9) × 1.2–2 cm, thinly leathery, finely but distinctly reticulate opposite 1(or 2) seeds, base cuneate, apex rounded, obtuse, or acute, with apiculate tip. Seeds oblong-reniform, ca. 10 × 5 mm. Fl. May.

• Mountain slopes, among bushes and thickets, along valleys; 700–1500 m. Gansu, Guizhou, Hubei, Hunan, Shaanxi, Sichuan, Yunnan, Zhejiang.

16. *Dalbergia jingxiensis* S. Y. Liu, J. Trop. Subtrop. Bot. 12: 575. 2004.

靖西黄檀 jing xi huang tan

Shrubs, 2–3 m tall. Branches spreading; branchlets grayish black, densely yellowish brown pubescent, glabrescent, lenticellate. Leaves 4–11 cm; petiole 8–12 mm, puberulent as rachis; leaflets 5–15, abaxially light green, adaxially green, oblong, 1–3.5 × 0.8–1.5 cm, abaxially sparsely appressed light brown pubescent and veins prominent, adaxially sparsely appressed grayish white pubescent and veins slightly impressed, base broadly cuneate or subrounded, margin revolute, apex rounded, obtuse, or emarginate, cuspidate; petiolules ca. 2 mm, densely light brown pubescent; terminal leaflet obovate-oblong. Panicles terminal and axillary, few branched, 2–5 × 1–3.5 cm, densely dirty brown pubescent. Flowers small, compact. Pedicel 1–2 mm. Calyx campanulate, 5–6 mm, densely blackish brown appressed hispidulous; tube ca. 4 mm, 5-toothed; teeth triangular or triangular-oblong, ca. 1 mm, lowest one longer than others, ca. 1.5 mm, inside densely pubescent, apex acuminate, rounded, or obtuse. Corolla white; petals subequal in length, clawed, claw 2–3 mm; standard obovate, orbicular, or suborbicular, sometimes cucullate, 3–4 × 2–2.5 mm, slightly unequally sided, apex rounded, obtuse, or emarginate; wings

oblong; keel obovate-oblong, as wings ca. 4 mm and auriculate on upper side below. Stamens 9, monadelphous, 4–5 mm; filaments alternately longer and shorter, occasionally among them 1 or 2 reduced and enlarged to petaloid. Ovary long stipitate, oblong, 1.5–2 mm, glabrous, 2- or 3-ovuled; style slender, ca. 2 mm; stigma small. Legume unknown. Fl. Jan–Feb.

- Rocky hills, thickets. Guangxi (Jingxi).

17. *Dalbergia cultrata* Graham ex Benth in Miquel, Pl. Jungh. 254. 1852.

黑黄檀 hei huang tan

Dalbergia fusca Pierre; *D. fusca* var. *enneandra* S. Q. Zou & J. H. Liu.

Trees; wood red. Branches slender, slightly finely appressed puberulent, glabrescent, lenticellate. Leaves 10–15 cm; stipules caducous; leaflets (7–)11–13, ovate or elliptic, 2–4 × 1.2–2 cm, leathery, abaxially appressed pubescent, at length glabrescent, adaxially glabrous, apex rounded or emarginate, cuspidate. Panicles axillary and infra-axillary, 4–5 cm; branches 2–3 cm, pubescent. Pedicel ca. 2 mm, slender, puberulent; bracteoles linear, ca. 1 mm, acute. Calyx campanulate, 5-toothed; upper 2 teeth conical, subconnate, lateral 2 broadly triangular, acute, lowest tooth ca. 1.5 × as long as others. Corolla white; petals rather long clawed; standard broadly obovate or subreniform; wings elliptic; keel arcuate. Stamens (9 or)10, monadelphous. Ovary stipitate, glabrous, 3-ovuled. Legume stipitate, oblong to strap-shaped, 6–10 × 0.9–1.5 cm, thinly leathery, finely reticulate opposite 1 or 2 seeds, both ends obtuse. Seeds reniform, compressed, ca. 10 × 6 mm. Fl. Feb, fr. Apr–Sep.

Mixed forests, mountain slopes; ca. 1700 m. Yunnan (Simao) [Laos, Myanmar, Vietnam].

18. *Dalbergia ximengensis* Y. Y. Qian, J. Trop. Subtrop. Bot. 7: 151. 1999.

西盟黄檀 xi meng huang tan

Trees, ca. 8 m tall. Branchlets lenticellate, pubescent. Leaves 10–14 cm; stipules caducous; leaflets 7–9, elliptic or obovate, 1.3–5.5 × 0.7–3.5 cm, thickly papery, both surfaces appressed pubescent, densely so on midvein abaxially, base rounded or cuneate, rarely subcordate, apex emarginate, rarely rounded and cuspidate. Panicles terminal, 5–7 cm, pubescent; branches 2–4 cm. Pedicel 0.5–1 mm, pubescent; bracteoles ovate, 0.8–1 mm, apex obtuse. Calyx campanulate, ca. 2 mm, outside pubescent, 5-toothed; upper 2 ovate, ca. 1 mm, lateral 2 oblong, 0.8–0.9 mm, apex obtuse, lowest one lanceolate, ca. 1.3 mm. Corolla white; petals clawed; standard obcordate, 3.3–3.5 mm; wings oblong-obovate, 2.7–2.9 mm; keel obliquely elliptic, 2.4–2.6 mm. Stamens 10, monadelphous. Ovary stipitate, pubescent on ventral suture, 2-ovuled. Legume oblong, 5.5–9.5 × 1.5–2.2 cm, base cuneate or attenuate, apex obtuse, cuspidate, valves thinly leathery, reticulate, 1- or 2-seeded. Seeds reniform, compressed, 8–13 × 5–9 mm. Fl. Apr, fr. Jul–Oct.

- Forests; ca. 1200 m. Yunnan (Ximeng).

19. *Dalbergia yunnanensis* Franchet, Pl. Delavay. 187. 1890.

滇黔黄檀 dian qian huang tan

Dalbergia collettii Prain; *D. yunnanensis* var. *collettii* (Prain) Thothathri.

Woody climbers, large, sometimes erect shrubs or small trees. Stems subsarmentose; branches numerous, spreading, some occasionally reduced to spiral-hooked. Leaves 20–30 cm; rachis puberulent; stipules caducous; leaflets (13–)15–19; petioles ca. 5 mm, pubescent; blades oblong, elliptic-oblong, or ovate, 2.5–5(–7.5) × 1–2(–3.3) cm, subleathery or membranous, both surfaces finely appressed pubescent, more densely so on midvein abaxially, both ends rounded, occasionally apex obtuse, emarginate. Panicles terminal, often extending into axils of upper leaves, compact, cymose; peduncles and branches puberulent. Flowers shortly pedicellate; bracteoles deciduous, ovate, membranous. Calyx campanulate, outside sparsely pubescent, 5-toothed; teeth with ciliate margins, lowest oblong, apex rounded, longer than others, others subequal and ca. as long as tube, upper 2 subconnate. Corolla white; standard broadly obovate-oblong, emarginate, cuneate base attenuate to short, broad claw; wings obovate-oblong; keel half-moon-shaped, shortly auriculate on upper side below, long, narrowly clawed as wings. Stamens 9, monadelphous; filaments free on upper side, alternately shorter and longer. Ovary long stipitate, glabrous or puberulent along suture, 2- or 3-ovuled; style short; stigma capitate. Legume oblong or elliptic, 3.5–6.5 × 2–2.5 cm, leathery, glabrous, distinctly reticulate opposite 1 seed or occasionally 2 or 3 seeds. Seeds orbicular-reniform, compressed, ca. 12 × 7 mm. Fl. Apr–Jun, fr. Aug–Oct.

Forests, sparse forests, thickets, mountain slopes; 1300–2200 m. Guangxi, Guizhou, Sichuan, Yunnan [Myanmar].

20. *Dalbergia obtusifolia* (Baker) Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 70: 42. 1901.

钝叶黄檀 dun ye huang tan

Dalbergia ovata Graham ex Benth var. *obtusifolia* Baker in J. D. Hooker, Fl. Brit. India 2: 231. 1876; *D. glauca* Kurz.

Trees, 13–17 m tall. Branches spreading; young shoots pendulous, glabrous. Leaves 20–30 cm; stipules early caducous; leaflets 5–7; petioles ca. 5 mm; blades elliptic or obovate, sometimes basal suborbicular, subleathery, terminal one largest, 5–14 × 4.5–8 cm, both surfaces glabrous, both ends rounded or sometimes apex emarginate and base broadly cuneate. Panicles terminal or axillary, 15–20 × 12–15 cm; peduncles and pedicels yellowish puberulent; bracts and bracteoles ovate, puberulent; bracteoles ca. 1/2 as long as calyx, caducous. Calyx campanulate, 5-toothed; teeth ovate, shorter than tube, obtuse, lowest tooth slightly longer than others. Corolla pale yellow; petals slightly long clawed; standard oblong, emarginate; wings and keel with downward short auricles on upper side below. Stamens 10, monadelphous; filaments alternately shorter and longer. Ovary long stipitate, elliptic, glabrous, 3-ovuled; style long; stigma small. Legume oblong to strap-shaped, 4–8 × 1–1.5 cm, leathery, distinctly reticulate opposite 1 or 2 seeds. Seeds reniform, ca. 10 × 6 mm; testa brown, smooth. Fl. Mar, fr. Jun–Aug.

• Open forests, mountain slopes, among bushes at riversides; 800–1300 m. Guizhou, S Yunnan.

21. *Dalbergia odorifera* T. C. Chen, Acta Phytotax. Sin. 8: 351. 1963.

降香黄檀 jiang xiang huang tan

Trees, 10–15 m tall, glabrous except for young shoots; inflorescence and ovary puberulent. Bark brown or pale brown, rough, longitudinally splitting; branchlets with small, dense lenticels. Leaves 12–25 cm; stipules caducous; petiole 1.5–3 cm; leaflets (7–)9–11(–13); petiolules 3–5 mm; blades ovate or elliptic, (2.5–)4–7(–9) × 2–3.5 cm, distal longest, basal pair ca. 1/3 as long as distal, subleathery, base rounded or broadly cuneate, apex obtuse to acuminate. Panicles axillary, 8–10 × 6–7 cm; peduncles 3–5 cm. Flowers ca. 5 mm, initially aggregated at apices of corymbose branches of inflorescence, lax afterward; bracts subtriangular, ca. 0.5 mm; bracteoles broadly ovate, ca. as long as ca. 1 mm pedicels. Calyx campanulate, ca. 2 mm, 5-toothed; lowest tooth lanceolate, longer than others, other teeth broadly ovate, acute. Corolla creamy white or pale yellowish; petals subequal in length, clawed; standard obcordate, ca. 5 mm including claw, ca. 3 mm wide, apex truncate, emarginate; wings oblong; keel half-moon-shaped, arcuate on lower side. Stamens 9, monadelphous. Ovary narrowly elliptic, 1- or 2-ovuled, with long stipe ca. 2.5 mm. Legume ligulate-oblong, 4.5–8 × 1.5–1.8 cm, leathery, apex obtuse or acute, base abruptly narrowed to slender 5–10 mm stipe; reticulation distinctly prominent opposite 1(or 2) seeds. Seeds reniform, compressed. Fl. Apr–Jun, fr. Jul–Dec.

• Open forests, mountain slopes, margins of forests or wastelands, beside villages; 100–500 m. Fujian, Hainan, Zhejiang.

22. *Dalbergia rimosa* Roxburgh, Fl. Ind., ed. 1832, 3: 233. 1832.

多裂黄檀 duo lie huang tan

Dalbergia discolor Blume ex Miquel; *D. mengsuoensis* Y. Y. Qian.

Woody climbers, sometimes erect shrubs or small trees, 4–6(–10) m tall. Leaves 10–20 cm; rachis and petioles puberulent; leaflets 5–9; petiolules puberulent; blade ovate, obovate, or elliptic, (3–)5–8 × (2–)2.5–5 cm, firmly papery, abaxially sparsely puberulent, adaxially glabrous and with dense, prominent veinlets, base rounded or broadly cuneate, apex acute, obtuse, or emarginate, cuspidate. Panicles terminal or sometimes extending into axils of uppermost leaves, 5–25 × 4–12 cm, with cymose, dichotomous branches. Flowers minute, ca. 3 mm; bracts and bracteoles persistent, ovate-lanceolate, ca. 1/2 as long as calyx tube. Calyx campanulate, 5-toothed; teeth subequal, rounded or obtuse except lowest rather longer and lanceolate. Corolla white or yellowish green; petals shortly clawed; standard obovate-oblong, emarginate; wings obovate or elliptic; keel half-moon-shaped. Stamens 9(or 10), monadelphous. Ovary stipitate, oblong, puberulent, 1- or 2-ovuled; style short. Legume oblong or sometimes elliptic, 5–8 × 2–4 cm, leathery, glabrous, reticulate throughout but strongly so opposite 1(or 2) seeds, base broadly cuneate, apex acute or obtuse. Seeds reniform, much compressed, ca. 12 × 6 mm; testa brown, shiny. Fl. Apr–Jun, fr. Jul–Dec.

Forests, open forests, mountain slopes, ravines, riversides; 800–1700 m. Yunnan [NE India, Indonesia, Laos, Malaysia, Myanmar, Thailand, Vietnam].

23. *Dalbergia stipulacea* Roxburgh, Fl. Ind., ed. 1832, 3: 233. 1832.

托叶黄檀 tuo ye huang tan

Woody climbers, large, sometimes small trees. Bark brown; branches spreading. Leaves 15–20 cm; stipules early caducous, ovate-lanceolate to lanceolate, membranous; leaflets 17–21; petiolules 1.5–2 mm; blades oblong to obovate-oblong, 2.8–3.5 × 1–1.2(–2) cm, lowest sometimes elliptic, 1.2–1.5 × ca. 1 cm, thinly papery, abaxially sparsely appressed puberulent, adaxially glabrous, base broadly cuneate or rounded, apex acute, ultimately rounded or obtuse, sometimes emarginate. Panicles in axils of leaves, which at apex of branchlets rise among clustered, scalelike, early-deciduous bracts; peduncle, rachis, branches, and bracts appressed brown pubescent, lower part of inflorescence with many scattered, ovate, membranous, empty bracts. Bracts of flowers smaller than inflorescence bracts; bracteoles obovate, enclosing ca. 2/3 of calyx. Calyx campanulate, puberulent; teeth ovate, shorter than tube except lowest ca. as long as tube. Corolla pale blue or pale purplish red; petals distinctly clawed; standard orbicular, slightly emarginate; wings with downward auricles on upper side below. Stamens 10, diadelphous (5+5). Ovary glabrous except for pubescent long stipe, 1(or 2)-ovuled; style slender; stigma small. Legume broadly ligulate to ovoid or elliptic, (6.5–)9–11 × 3.2(–4) cm, firmly leathery, glabrous, not veined except sometimes opposite seed where mesocarp is much thickened, base cuneate or rounded, apex obtuse or rounded, 1-seeded, very rarely 2-seeded. Seeds reniform, ca. 15 × 8 mm. Fl. Apr–May, fr. Aug–Jan.

Open forests, ravines to mountain summits; 700–1700 m. Yunnan [Cambodia, NE India, Laos, Malaysia, Myanmar, Thailand, Vietnam].

24. *Dalbergia assamica* Benth in Miquel, Pl. Jungh. 256. 1852.

秧青 yang qing

Dalbergia balansae Prain; *D. lanceolaria* Linnaeus f. var. *assamica* (Benth) Thothathri; *D. szemaoensis* Prain.

Trees, 7–10 m tall. Branches horizontally spreading. Leaves 25–30 cm; stipules caducous, large, leaflike, ovate to ovate-lanceolate, ca. 10 × 6 mm; leaflets 13–21; petiolules ca. 5 mm, puberulent, soon glabrous; blade oblong or oblong-elliptic, 3–5(–6) × 1.5–2.5(–3) cm, papery, both surfaces sparsely appressed puberulent, but soon glabrous adaxially, with close, finely, slightly prominent reticulate veinlets on both surfaces, base rounded or cuneate, apex obtuse, rounded or emarginate. Panicles axillary, lax, 10–15 × 7.5–10 cm; peduncles, branches, and pedicels densely rusty puberulent; bracts and bracteoles deciduous, ovate, puberulent. Flowers 6–8 mm. Calyx campanulate, 5-toothed; lowest tooth longer than tube and ca. 2 × as long as triangular, acute others, upper 2 teeth subconnate. Corolla white, with purple stripes inside; petals long clawed; standard reflexed, orbicular, emarginate, base slightly thickened;

wings broadly ovate; keel half-moon-shaped, with downward auricles on upper side below as wings. Stamens 10, diadelphous (5+5); filaments free in upper 1/3, alternately shorter and longer. Ovary stipitate, pubescent, 1–4-ovuled; style subulate, slender; stigma minute. Legume broadly ligulate or oblong to strap-shaped, 5–9 × 1.2–1.8(–2.5) cm, leathery, base attenuate, cuneate, apex acute, inconspicuously reticulate opposite 1 or 2(–4) seeds. Seeds reniform, compressed, ca. 6 × 2.5 mm. Fl. Apr–Jul, fr. Sep–Dec.

Mixed forests, open forests, among bushes, mountain slopes, riversides, wastelands beside villages; 300–1700 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Sichuan, Yunnan, Zhejiang [India (Sikkim), Laos, Myanmar, Thailand, Vietnam].

One of us (Chen) prefers to recognize *Dalbergia assamica* and *D. balansae* as separate species.

25. *Dalbergia sericea* G. Don, Gen. Hist. 2: 375. 1832.

毛叶黄檀 mao ye huang tan

Dalbergia hircina Buchanan-Hamilton ex Benth.

Trees, 5–6 m tall. Young shoots silky puberulent, gradually glabrous. Leaves 15–25 cm; stipules caducous, subfalcate-lanceolate, silky puberulent; leaflets 17–21, ovate or oblong, 2.5–5 × 2–2.5 cm, papery, abaxially rather densely puberulent, adaxially appressed puberulent, base rounded or cuneate, apex slightly obtuse. Panicles axillary, rather shorter than leaves, 2.5–5 × 1.2–2 cm; peduncles, branches, and pedicels densely silky puberulent. Calyx campanulate, densely puberulent, 5-toothed; teeth obtuse, shorter than tube except lowest lanceolate and ca. as long as tube. Corolla white; petals rather long clawed; standard suborbicular, emarginate. Stamens 10, diadelphous (5+5). Ovary shortly stipitate, pubescent, 4- or 5-ovuled; style slender; stigma small. Legume narrowly ligulate, 2.5–5 × 0.6–1 cm, leathery, reticulate opposite 1–3 seeds, base attenuate to short stipe, apex acute. Seeds reniform, compressed, ca. 5 × 2.5 mm. Fl. Apr–May, fr. Jun–Sep.

Mountain slopes, roadsides; 900–1600 m. SE Xizang (Zayü) [Bhutan, NE India, Myanmar, Nepal, N Vietnam].

26. *Dalbergia hainanensis* Merrill & Chun, Sunyatsenia 2: 32. 1934.

海南黄檀 hai nan huang tan

Trees, 9–16 m tall. Bark dull gray, furrowed; young shoots slightly puberulent. Leaves 15–18 cm; rachis and petioles brown puberulent; leaflets (7–)9–11; petiolules 3–4 mm, brown puberulent; blades ovate or elliptic, 3–5.5 × 2–2.5 cm, papery, both surfaces yellowish brown appressed puberulent when young, subglabrous when old, base rounded or broadly cuneate, apex shortly acuminate, obtuse at tip. Panicles axillary, 4–9(–13) × 4–10 cm, slightly brown puberulent. Flowers small, initially orbicular; bracteoles ovate to suborbicular. Calyx ca. 5 mm, brown puberulent as pedicels, 5-toothed; teeth unequal. Corolla pale pink; petals each with long claw 2–2.5 mm; standard obovate-oblong, ca. 9 × 5 mm; wings rhombic-oblong, 9–10 × ca. 3 mm; shorter keel and wings with downward auricles on upper side. Stamens 10, diadelphous (5+5). Ovary shortly

stipitate, linear, densely puberulent except on style, 1–3-ovuled. Legume straight or slightly curved, oblong, oblanceolate, or strap-shaped, 5–9 × 1.5–1.8 cm, brown puberulent, obscurely prominent and reticulate opposite 1(or 2) seeds, base cuneate, attenuate to a short stipe, apex acute. Seeds reniform, compressed. Fl. Mar–Apr, fr. May–Jul.

• Sparse or dense forests, mountain slopes; sea level to 700 m. Hainan.

27. *Dalbergia hupeana* Hance, J. Bot. 20: 5. 1882.

黄檀 huang tan

Dalbergia hupeana var. *bauhiniifolia* Pampanini; *D. sacerdotum* Prain.

Trees, 10–20 m tall. Bark dull gray; young shoots pale green, glabrous. Leaves 15–25 cm; leaflets 7–11, elliptic to oblong-elliptic, 3.5–6 × 2.5–4 cm, subleathery, both surfaces glabrous, shiny adaxially, veinlets prominent, base rounded or broadly cuneate, apex obtuse or slightly emarginate. Panicles terminal or extending into axils of uppermost leaves, 15–20 × 10–20 cm, sparsely rusty puberulent. Flowers 6–7 mm. Pedicel ca. 5 mm, sparsely rusty puberulent as calyx; bracts and bracteoles deciduous, ovate, pubescent. Calyx campanulate, 2–3 mm, 5-toothed; upper pair of teeth rounded, subconnate, lateral 2 smaller, ovate, lowest tooth lanceolate, ca. 2 × as long as others. Corolla white or light purple; petals clawed; standard orbicular, emarginate; wings obovate and half-moon-shaped; keel auriculate on upper side below. Stamens 10, diadelphous (5+5). Ovary shortly stipitate, glabrous except at base and stipe, 2- or 3-ovuled; style slender; stigma capitate, small. Legume oblong or broadly ligulate, 4–7 × 1.3–1.5 cm, thinly leathery, reticulate opposite 1 or 2(or 3) seeds, base attenuate to stipe, apex acute. Seeds reniform, 7–14 × 5–9 mm. Fl. May–Jul.

• Forests, among bushes on mountain slopes, ravines, by streams, woodland slopes; 800–1400 m. Anhui, Fujian, Guangdong, Guangxi, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shandong, Shanxi, Sichuan, Yunnan, Zhejiang.

28. *Dalbergia polyadelpa* Prain, Ann. Roy. Bot. Gard. (Calcutta) 10: 84. 1904.

多体蕊黄檀 duo ti rui huang tan

Trees, 4–10 m tall. Leaves 10–20 cm; rachis and petioles densely rusty tomentose; stipules very caducous, ovate-lanceolate; leaflets (7 or)9(or 11–13); petiolules ca. 3 mm, densely rusty tomentose; blades ovate to ovate-lanceolate, 1.5–4(–7) × 0.8–1.6(–2.8) cm, firmly papery, abaxially glabrescent or sparsely appressed puberulent, adaxially glabrous except for puberulent midvein, base cuneate or rounded, apex acuminate or obtuse, sometimes mucronate. Panicles axillary or infra-axillary, rather compact, ca. 6 × 5.5 cm; peduncles slightly stout, glabrous. Pedicel ca. 5 mm; bracts ovate; bracteoles deciduous, lanceolate, sparsely pubescent. Calyx campanulate, ca. 5 mm; tube outside glabrous below, sparsely puberulent above, 5-toothed; teeth ciliate, unequal, lowest lanceolate, ca. as long as tube and longer than others, lateral 2 triangular; upper pair ovate, subconnate. Corolla white; petals distinctly striate; standard broadly ovate, base attenuate to short, broad claw; oblong

wings and half-moon-shaped keel with downward broad auricles on upper side below. Stamens 10; filaments connate at base, irregularly separated to incompletely 3–5-adelphous on upper part. Ovary glabrous except for pubescent long stipe, 3- or 4-ovuled; style subulate-conical; stigma minute. Legume oblong to strap-shaped, (4–)7–9.5 × 1.5–2.8 cm, leathery, glabrous except for short stipe, distinctly reticulate opposite 1 or 2 seeds. Seeds reniform to subreniform-oblong, compressed, ca. 9 × 4 mm; testa black, shiny. Fl. Mar, fr. Apr–May.

Mountain slopes, thickets, bushes; 1000–2000 m. Guangxi, Guizhou, Yunnan [N Vietnam].

29. *Dalbergia tonkinensis* Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 70: 42. 1901.

越南黄檀 yue nan huang tan

Trees, 5–13 m tall. Leaves 9–20 cm; rachis glabrous; stipules caducous, small, tawny puberulent; leaflets (7–)9–11; petiolules glabrous; blades ovate, 4–9 × (1.8–)3–5 cm, subleathery, sparsely puberulent when young, soon glabrous, base rounded, apex shortly acuminate. Panicles corymbose, axillary, ca. 5 × 3.8 cm. Flowers white, fragrant. Legume distinctly stipitate, ovoid or oblong, 5–7.5 × ca. 2 cm, reticulate opposite seeds, base cuneate, apex subacute. Seeds reniform, compressed, ca. 9 × 5 mm.

Hainan [N Vietnam].

The present authors have seen no material of this species from China.

55. **PTEROCARPUS** Jacquin, Select. Stirp. Amer. Hist. 283. 1763, nom. cons., not Linnaeus (1754).

紫檀属 zi tan shu

Trees. Branches spreading, glabrous to pubescent. Leaves alternate, imparipinnate; stipules small, caducous; stipels absent; leaflets alternate, rarely subopposite. Inflorescence a simple raceme to a lax, terminal or axillary panicle. Flowers yellow; bracts and bracteoles small, caducous. Pedicel articulate. Calyx often incurved, obconical, 5-toothed; teeth short, upper 2 ± connate. Corolla papilionaceous, exserted beyond calyx; petals long clawed; standard ovate to orbicular, as keel crisped on margin. Stamens 10, monadelphous to diadelphous (5+5 or 9+1), staminal sheath split open dorsally; anthers versatile. Ovary stipitate or sessile, 2–6-ovuled; style incurved, filiform, glabrous; stigma terminal. Legume indehiscent, orbicular, compressed, broadly hardened winged around margin, usually 1-seeded; style persistent, incurved. Seeds oblong or subreniform, hilum small.

About 30 species: pantropical with the exception of Australia, with the greatest diversity in Africa; one species in China.

1. *Pterocarpus indicus* Willdenow, Sp. Pl. 3: 904. 1802.

紫檀 zi tan

Pterocarpus wallichii Wight & Arnott; *P. zollingeri* Miquel.

Trees, 15–25 m tall. Bark grayish. Leaves 15–30 cm; stipules early caducous; petiolules 4–7 mm; rachis and petiolule glabrous; leaflets 5–7(–11), ovate-elliptic, 5–11 × 3.5–5.5 cm, thinly papery, both surfaces glabrous, veins slender, lateral veins 6–8 pairs, base truncate, margin entire, apex shortly acuminate. Inflorescence a raceme or panicle, mostly axillary, rarely terminal, 10–18 cm, puberulent. Flowers 1–1.5 cm; bracteoles 2, linear-oblong, at base of calyx. Pedicel 7–10 mm, slender. Calyx campanulate, 4–6 mm, appressed brown silky; teeth broadly

triangular, ca. 1 mm, 2 larger than others. Corolla yellow; petals long clawed; standard ovate-orbicular to oblong, crisped at margin; wings oblong, ca. as long as standard; keel narrowly oblong, smaller than wings. Stamens 10, diadelphous (9+1), sheath 8–9 mm, vexillary filament free to base, filaments of varying heights; anthers versatile. Ovary shortly stipitate, oblong, 7–8 mm, densely pubescent; ovules 2; style curved; stigma minute. Legume orbicular, 4–4.5 × 3.5–4.5 cm, shortly stalked, flat, slightly hairy and reticulate opposite seed, 1-seeded, broadly winged around margin, wing to 2 cm wide. Seed brownish, reniform, narrow and oblique. Fl. Mar–Apr, fr. Apr–May.

Open forests on slopes, cultivated in villages and gardens. Guangdong, Taiwan, Yunnan [India, Indonesia, Malaysia, Myanmar, Papua New Guinea, Philippines, Thailand, Vietnam; Pacific islands].